to compare the plants' health and productivity with those in other pasture areas regularly grazed by the farm's 106 Jersey and Holstein cows.

Flipping a switch on the chamber's control panel, Skinner starts a motor that draws in air and pipes it into the chamber. Of chief interest is the rate at which pasture plants absorb carbon dioxide to drive photosynthesis. The rate at which carbon is stored gives scientists a clue to the productivity of pasture plants.

"We want to see if there's a difference in pasture production levels when it's cut for hay versus when it's grazed," says Skinner. In dairy circles, "there's been some question as to whether it's better to graze, or to cut a pasture for hay."

For Cambridge, New Zealand, graziers Ron Geck and his wife Willy, who visited Glenn Moyer in June, there's no better alternative, because of high feed costs and other prohibitive expenses.

Sitting at a picnic table in front of the farm's main home, Ron likens the practice to playing chess. "When you're grazing, set your farm up so you can still graze under difficult conditions," he says. Drawing on 30 year's experience, he adds "grazing's a science and should be treated that way."—By **Jan Suszkiw,** ARS.

*This research is part of Animal Production Systems (#102); Rangelands, Pastures, and Forages (#205); and Water Quality and Management (#201), ARS National Programs described on the World Wide Web at http://www.nps.ars.usda.gov/programs/appvs.htm http://www.nps.ars.usda.gov/programs/nrsas.htm.*

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*American Farm Trust hosts a Cove Mountain Farm web site at http://grassfarmer.com.* ◆

# Clues to Redder, More Nutritious Tomatoes

Tomatoes with much more lycopene than those now found in stores may be on the horizon if ARS research pans out.

Epidemiological research has shown that lycopene, which gives tomatoes their bright-red color, may help reduce the risk of some cancers.

While working with tomato tissue cultures, ARS biologist Betty K. Ishida serendipitously uncovered clues about ripening and lycopene formation. As expected, the culture developed into a cherry tomato. Surprisingly, the fruit's green outer leaves, known as the calyx, also ripened into fruitlike tissue.

"We discovered that in this particular tomato, called VFNT cherry, low growing temperatures trigger ripening in nonfruit tissue," says Ishida. Because the fruit was very dark red, they also tested the lycopene content. It was 10 times the amount found in most commercial tomatoes.

But the process doesn't work outside tissue culture. "Something else in the plant prevents this transformation into fruit," she says.

Ishida is on the trail to find the trigger that turns on the gene responsible for the increased lycopene. "When we find that, we can apply it to commercial varieties," she says.

Medical researchers have shown that the lycopene in processed tomato products—like spaghetti sauce—is absorbed to a greater extent than lycopene in the fresh fruit.

Ishida is looking at how different forms of lycopene develop. And she wants to find out if changing the form would increase the nutritional benefits of her high-lycopene tomatoes.

"In tomatoes, lycopene is a long-chain molecule," Ishida says. "But in human blood plasma, lycopene appears in several different shapes—the chain is 'bent' in various ways." Tomatoes with the bent form (known as "cis"-lycopene) might be more beneficial if this lycopene were more easily absorbed. She plans to develop tomatoes with high cis-lycopene for testing.

"The goal of this research is to produce tomatoes that have more value to consumers," she says.—By **Kathryn Barry Stelljes,** ARS.

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